

and 70° at Rio Grande City. *Utah*: 44° at Salt Lake City and 30° at *Coalville. *Vermont*: 40° at Burlington and 36° at *Woodstock. *Virginia*: 58° at Fort Whipple. *Washington Territory*: 41° at Olympia. *West Virginia*: 46° at *Helvetia. *Wisconsin*: 51° at Milwaukee and 46° at *Neillsville. *Wyoming*: 40° at Cheyenne.

Those marked with a star (*) are reported by U. S. Army Post Surgeons or Voluntary Observers.

Ranges of Temperature at Signal Service Stations.—The monthly ranges will appear from the maxima and minima just given. The greatest daily ranges vary in New England, from 19° at Wood's Holl to 32° at Burlington; Middle Atlantic States, from 16° at Chincoteague to 27° at Albany; South Atlantic States, from 18° at Savannah to 24° at Wilmington and Jacksonville; Eastern Gulf States, from 20° at Pensacola to 25° at Montgomery; Western Gulf States, from 14° at Galveston to 28° at Vicksburg; Ohio valley and Tennessee, from 20° at Cairo to 37° at Pittsburgh; Lower Lake region, from 24° at Sandusky to 33° at Oswego; Upper Lake region, from 24° at Chicago to 34° at Marquette; Upper Mississippi valley, from 24° at Davenport to 31° at Des Moines, Dubuque and St. Paul; Missouri valley, from 26° at Omaha to 41° at Bismarck; Texas, from 24° at Laredo to 35° at Fort Elliott and 41° at El Paso; Red River of the North valley, from 32° at Pembina to 39° at Breckenridge; Northern Plateau District, from 39° at Lewiston to 46° at Ft. Shaw; Middle Plateau District, from 31° at Salt Lake City to 47° at Winnemucca; Southern Plateau District, from 32° at Santa Fe to 40° at Wickenburg; Rocky Mountain Stations, 20° at Pikes Peak, 37° at Denver, 39° at Virginia City and 41° at Cheyenne; California, from 18° at San Francisco to 42° at Visalia; Northern Pacific coast region, from 31° at Olympia to 43° at Umatilla.

Frost.—*California*: Lompoc, 18th; Campo, 30th and 31st, injuring vegetables. *Colorado*: Hermosa, 30th and 31st; Summit, frequent; Pikes Peak, 2nd, 7th, and frequent after 16th. *Connecticut*: New London, 16th, light in low lands near. *Idaho*: Boise City, 25th and 26th, in low places. *Maine*: Bangor, 25th and 26th; Portland, 27th, in suburbs of city. *Massachusetts*: Rowe, 16th; Springfield, 16th and 20th; Westborough, 16th and 27th; Boston, 16th, light in suburbs. *Michigan*: Thornville, 3rd, on low grounds. *New Hampshire*: Auburn and Contoocookville, 16th, on low grounds; Grafton, 12th and 26th; 16th, damaging corn in low places, "frost very general throughout State;" Mount Washington, 5th, 6th, 15th, frost feathers 3 to 6 inches long in exposed places; 10th to 23rd. *New Jersey*: Freehold, 16th, 5 miles SE. of station; Linden, 18th. *New York*: Ardenia, North Volney and near Penn Yan, 16th; Palermo, 16th, light; Cooperstown, Port Jervis and Nile, 16th and 17th, injuring corn, buckwheat and potatoes at latter place; Buffalo, 16th, on low grounds; Albany, 16th, on mountains near, damaging vegetables. *Nevada*: Carson City, 11th, 26th, 30th and 31st; Winnemucca, 31st. *Pennsylvania*: Blooming Grove, 16th, damaging buckwheat; Wellsboro, 16th; Dyberry, 16th and 17th, killing corn in places. *Utah*: Coalville, killing vegetables 28th. *Vermont*: Woodstock and Stafford, 16th and 26th; Lunenburg, 26th.

Ice.—*Colorado*: Summit, 3rd. *Montana*: Virginia City, 30th. *Nevada*: Winnemucca, 31st.

PRECIPITATION.

The general distribution of rain-fall, for August, 1880, is shown on chart No. III, as accurately as possible, from about 500 reports. The table on this chart shows the average precipitation for August, as compared with that of the present month. Departures exceeding one inch from the normal precipitation are as follows: Missouri valley about 1.20 excess; Lower Lake region 1.70 excess; Florida Peninsular 4.03 excess; the Gulf States about 1.25 deficiency; St. Lawrence valley about 1.25 deficiency. In Oregon and the extreme southern part of California slight deficiencies are reported, while in northern and central California no rain has fallen. The great excess in the Florida peninsula resulted from the cyclone of August 29th. As shown below a most unusual number of heavy rains occurred during the month.

Special Heavy Rains.—1st, Corning, Mo., 1.70 inches in 1 hour, 50 minutes; Jacksonville, 3.30 in. in 8 hrs.; Pierce City, Mo., 2.50 in. 2nd and 3rd, Laredo, Tex., 3.18 in. in less than 6 hrs.; Cincinnati, 2.95 in. in 24 hrs.; Wellsboro, Pa., 3.92 in. 3rd, Highland, N. C., 2 in.; New Orleans, 1.17 in. in 50 min.; Fort Barrancas, Fla., 4.08 in. in 18 hrs. 3rd to 5th, Charlotte, N. C., 6.57 in. in 48 hrs. 3rd and 4th, Ellsworth, N. C., 13.00 in., of which 9.00 in. fell in 3½ hrs.; Cape May, 2.95 in. in 24 hrs.; Brookhaven, N. Y., 4.16. 4th, New London, 1.32 in. in 8 hrs.; Mystic, Conn., 2.10 in.; Fort Adams, R. I., 3.10 in.; Fortress Monroe, Va., 2.06 in. 4th to 6th, Cape Henry, 5.16 in. in 48 hrs.; Norfolk, 7.20 in., of which 2.15 in. fell in 8 hrs.; Chincoteague, 5.84 in., of which 2.05 in. fell in 8 hrs. 4th to 7th, Weldon, N. C., 6.68 in. 4th and 5th, Fall River, Mass., 2.95 in. in 17 hrs.; Somerset, 2.57 in., of which 2.00 in., fell in 1 hr. 10 min.; Fall River, 2.25 in. in 28 hrs.; Vine-land, N. J., 2.85 in. in 21 hrs.; Dover Mines, Va., 2.15 in. in 25 hrs. 30 min.; Johnstown, Va., 2.08 in., in 44 hrs.; New Bedford, Mass., 3.20 in. in 25 hrs. 30 min.; Newport, R. I., 3.57 in. in 24 hrs.; Barnegat, 2.41 in. in 24 hrs. 5th, Highland, N. C., 2.85 in.; Kittyhawk, 2.40 in. 5th and 6th, Cedar Keys, Fla., 5.38 in., of which 4.06 in. fell in 16 hrs. 6th, Fortress Monroe, Va., 3.75 in. Thomasville, Ga., 2.04 in. in 5 hrs. 40 min. 8th, Fayette, Miss., 2.60 in. in 6 hrs. 30 min.; Rio Grande City, Texas, 1.81 in. in 8 hrs. 9th, Point Pleasant, La., 2.00 in.; Fort Scott, Kan., 2.62 in. in 10 hrs. 10th, White Plains, N. Y., 1.80 in. in 1 hr. 30 min.; Fort Barrancas, Fla., 2.64 in. 11th, Wellsboro, Pa., 1.60 in. in 30 min.; Wilmington, 2.02 in. in 8 hrs., South Orange, N. J., 2.10 in. in

less than 10 hrs.; Edinburg, Texas, 2.40 in. in 2 hrs. 30 min.; Huhneville, Pa., 1.05 in. in 25 min.; 11th and 12th, Rio Grande City, Texas, 2.90 in. in 24 hrs. 12th, Smithville, N. C., 2.40 in. in 8 hrs.; Brownsville, Tex., 11.71 in. in 24 hrs.; Rio Grande City, 2.90 in. in 24 hrs. 12th and 13th, Indianola, 7.21 in., of which 4.10 in. fell in 16 hrs. 13th, San Antonio, Tex., 7.22 in., of which 6.74 in. fell in 16 hrs.; Uvalde, Tex., 3.12 in.; Brackettsville, 3.55 in.; Eagle Pass, Tex., 4.57 in.; Laredo, Tex., 2.49 in. 13th and 14th, Fredericksburg, Tex., 4.55 in.; Castroville, Tex., 5.80 in. in 24 hrs.; Austin, Tex., 2.83 in.; Mason, Tex., 2.91 in. in 24 hrs.; Uvalde, Tex., 4.96 in., of which 4.21 in. fell in 24 hrs. 14th, Fort Concho, Tex., 1.60 in.; Fort Stockton, Tex., 2.72.; Fort McKavett, Tex., 2.41 in.; Mason, 2.35 in.; Stockton, Tex., 2.72 in. 15th, Highland, N. C., 1.25 in. in 1 hr.; Little Rock, 3.30 in. in 2 hrs. 20 min.; Omaha, 0.80 in. in 20 min. 15th and 16th, Ellsworth, N. C., 4.33? in. 16th, Memphis, 1.86 in. in 47 min.; Charlotte, N. C., 2.00 in. in 4 hrs.; Boonsboro, Iowa, 2.25 in. 16th and 17th, Pembina, 2.54 in. in 24 hrs. 17th, Vicksburg, Miss., 2.22 in. in 2 hrs. 40 min.; Cleveland, 0.87 in. in 30 min. 19th, Buffalo, N. Y., 1.60 in. in 1 hr. 19th and 20th, Bellefontaine, O., 5.28 in. in 24 hrs. 25 min.; Columbus, O., 3.79 in. in 12 hrs. 20th, New Corydon, Ind., 2.25 in. in 11 hrs. 45 min.; Louisville, 0.50 in. in 18 min.; Dodge City, 2.07 in. in 2 hrs. 50 min. 21st, Flushing, N. Y., 1.00 in. in 1 hr.; New Haven, 1.72 in. in 1 hr. 40 min.; Willett's Point, N. Y., 1.24 in. in 45 min.; El Paso, Tex., 1.00 in. in 2 hrs. 23rd, Des Moines, 2.07 in. in 16 hrs.; Stockton, Tex., 2.55 in.; Kittyhawk, 3.31 in. in 17 hrs. 35 min.; Boonsboro, Iowa, 2.00 in.; Corning, Mo., 2.95 in.; Stockton, Texas, 2.45 in.; Portsmouth, N. C., 2.10 in 8 hrs. 23rd and 24th, Howard, Neb., 3.45 in.; Morrison, Ill., 4.52 in., of which 3.00 in. fell in 8 hrs. 15 min.; Phelps City, Mo., 5.65 in. in 17 hrs. 24th, Manhattan, Kan., 1.32 in. in 30 min.; Topeka, Kan., 3.44 in. in 7 hrs.; Jacksonburg, O., and Coldwater, Mich., 1.00 in. in 1 hr. 24th and 25th, Kittyhawk, 2.52 in. in less than 16 hrs.; Fort Keogh, Mont., 1.13 in. in 10 hrs. 25th, New York, 1.45 in. in 2 hrs. 20 min.; Manhattan, Kan., 1.35 in. in 1 hr.; Philadelphia, 2.08 in. in 2 hrs.; Grand Haven, 3.10 in. in 16 hrs.; Fort McHenry, Baltimore, 2.24 in.; Somerville, N. J., 2.13 in. in 1 hr.; Chattanooga, 1.31 in. in 1 hr. 30 min. 25th and 26th, Muscatine, Ia., 2.04 in. in 12 hrs.; Omaha, 1.54 in. in 3 hrs.; Paterson, N. J., 2.43 in. in 2 hrs. 26th, Davenport, 1.40 in. in 4 hrs.; Madison, Wis., 1.42 in. in 1 hr. 45 min.; De Soto, Neb., 2.18 in. in 2 hrs.; Cheyenne, 0.45 in. in 20 min.; Cincinnati, 4.50 in. 27th, Peoria, Ill., 2.10. 27th and 28th, Genoa, Neb., 2.40 in. in 8 hrs. 28th, Little Mountain, O., 1.95 in. in 9 hrs.; Lunenburg, Vt., 1.70 in. in 2 hrs.; Mt. Washington, 1.12 in. in 3 hrs.; Fort Sill, I. T., 2.40 in. in 9 hrs.; Lawrence, Kan., 2.45 in. in 11 hrs.; Cheyenne, 1.30 in. in 35 min.; Helvetia, W. Va., 0.58 in. in 20 min.; Carrollton, Mo., 3.25 in. in 7 hrs. 29th, New Haven, 3.34 in., of which 2.18 in. fell in 3 hrs., and 1.16 in. in less than 1 hr.; Bismarek, Dak., 1.32 in. in less than 8 hrs.; Coldwater, Mich., 0.50 in. in 10 min.; Hat Creek, Wyo., 2.15 in. in 4 hrs.; Carrollton, Mo., 2.00 in. in 6 hrs. 29th and 30th, Daytona, Fla., 7.31 in.; Somerset, Mass., 2.81 in. in 26 hrs. 30th, Dover Mines, Va., 2.70 in. in 4 hrs. 45 min.; New Harmony, Ind., 1.18 in. in 75 min.; Augusta, Ga., 0.51 in. in 13 min. 30th and 31st, Thomasville, Ga., 4.05 in.; Yates Centre, Kan., 0.62 in. in 20 min. 31st, Fort Scott, Kan., 3.10 in. in 7 hrs.; Cape Henry, 2.01 in. in 44 hrs. 30th and 31st, Cedar Keys, Fla., 6.73 in.; Richmond, Va., 3.27 in.

Largest Monthly Rain-falls.—Ellsworth, N. C., 28.33 inches; Cedar Keys, Fla., 19.45; Cape Hatteras, 15.30; Brownsville, 16.58; Thomasville, Ga., 12.73; Corning, Mo., 12.61; Kansas City, Mo., 12.26. (Missouri Weather Review); Ft. Scott, Kan., 11.61; Kittyhawk, N. C., 11.18; Charlotte, N. C., 10.57; Daytona, Fla., 10.51; Phelps City, Mo., 10.50; Ft. Barrancas, Fla., 10.16; Kansas City (Signal Service), 10.13; Chincoteague, Va., 10.00; Weldon, N. C., 9.98; Norfolk, 9.90.

Smallest Monthly Rain-falls.—California, north of Los Angeles, and in Nevada, (except Humboldt and a few stations south and west), no rain fell; Clarksville, Texas, none; Yuma and Los Angeles, trace; Winnemucca and Boise City, 0.02; Texas Hill, Ariz., 0.03; St. George, Utah, 0.05; San Geronio, Cal., 0.09; Corinne, Utah, 0.10; Austin, Nev., 0.11; Decatur, Texas, 0.14; Humboldt, Nev., and White Hill, Ariz., 0.25; Kingston, Can., 0.29 (?); Carlin, Nev., 0.34; Griffin, Tex., 0.40; Pioche, Nev., 0.47; Fillmore, Utah, 0.50.

Rainy Days.—The number of days on which rain or snow has fallen, varies as follows: New England, 9 to 17; Middle Atlantic States, 9 to 16; South Atlantic States, 10 to 19; Eastern Gulf States, 12 to 15; Western Gulf States, 5 to 18; Ohio valley and Tennessee, 7 to 20; Lower Lake region, 11 to 17; Upper Lake region, 12 to 16; Upper Mississippi valley, 7 to 14; Missouri valley, 9 to 13; Red River of the North valley, 9 to 15; Texas, 1 to 16; Rocky Mountains, 7 to 22; Middle Plateau, 1 to 4; California, 0 to 2; Oregon, 4 to 5.

Cloudy Days.—The number varies in New England from 2 to 11; Middle Atlantic States, 7 to 19; South Atlantic States, 4 to 18; Eastern Gulf States, 4 to 11; Western Gulf States, 2 to 9; Ohio valley and Tennessee, 4 to 11; Lower Lake region, 6 to 13; Upper Lake region, 6 to 13; Upper Mississippi valley, 1 to 10; Missouri valley, 7 to 9; Red River of the North valley, 8 to 9; Texas 2 to 10; Rocky Mountains, 2 to 8; Middle Plateau, 0 to 4; California, 0 to 5; Oregon, 1 to 9.

Hail.—*Arizona:* Camp Verde, 6th, three-fourths of an inch in circumference, damaging vegetables. *Colorado:* Summit, 3rd, 8th, 10th, 12th, 15th; Pike's Peak, 1st to 3rd, 7th, 8th, 14th and 25th to 28th. *Indiana:* New Corydon, 17th; Logansport, 2nd. *Iowa:* Guttenburg, 16th. *Maine:* Bangor, 10th. *Michigan:* Coldwater, 17th; Lansing, 18th. *Minnesota:* Duluth, 12th. *Nebraska:*

Desoto, 27th and 31st. *New Hampshire*: Mt. Washington, 12th. *New Jersey*: South Orange, 11th; Sommerville, 25th, one-third of an inch in diameter. *North Carolina*: Highlands, 17th. *Ohio*: Bethel, Jacksonburg and Norwalk, 11th. *Pennsylvania*: Halmville, 25th. *Wyoming*: Cheyenne, 26th.

Snow.—*Colorado*: Sunmit, 1st to 3rd, one inch. *Nevada*: Winnemucca, 29th, on neighboring mountains. *Utah*: Salt Lake City, in the mountains near, on the 30th. *Wash. Ter.*: Pomeroy, 29th, on hill near town.

Floods.—Ellsworth, N. C., exceedingly heavy rains from 1st to 6th, caused washouts on mountain division of N. C. R. R. North Platte, 26th, very heavy rains caused washouts on the U. P. R. R., delaying trains for two days. 14th, extremely heavy rains rendered all streams between San Antonio, Tex., and the Rio Grande river impassable; at Fort McKavett water rose 10 feet in 10 minutes at 4 p. m. of the 14th. On the 17th, Pecos river, Texas, impassable; bridge at Horsehead crossing swept away. At Castroville, Texas, on the 8th, river rose and became impassable in 15 minutes. Pittsburgh, 19th, violent thunder-storm; rain flooded part of Alleghany City. Colorado Springs, Colorado, 25th, heavy rain; washouts reported on D. & R. G. R. R. Rochester, 19th, very heavy rain, bursting sewers and flooding many streets. Richmond, Va., August 30th, violent thunder-storm with heavy rain, flooding the entire lower part of city, doing much damage. 21st, heavy rains of "past few days" in southern Colorado caused many washouts on different railways. Track of South Park Railway badly damaged between Thompson and Pine Grove. Bad washout on D. & R. G. R. R., on the 20th near the Divide. On the 20th Kansas Pacific trains delayed by bad washouts. Pomeroy, Wash. Ter., 29th, 2:45 p. m., a small cloud burst near town, flooding some houses.

Droughts.—Waveland, Ind., to August 23rd, very severe. Creswell, Kan., severe to 18th. Auburn, N. H., 31st, severe, "vegetation suffering badly, streams drying up;" Winnemucca, Nev., 17th, the "Sink" of the Humboldt completely dry, said to be the first time within the memory of man. Des Moines, 15th, "crops suffering." Wellington, Kan., 27th. Carrollton, Ill., and Independence, Mo., to August 20th, corn and other crops severely damaged. The *Missouri Weather Review* states that the entire State suffered from drought till the 20th.

Rainfall during July, received too late to be used in July Review.—*Arizona*, Camp Thomas, 0.87 inch; Ft. Lowell, 1.88; Ft. Verde, 1.59. *California*, Angel Island, Presidio, S. F., and Ft. Gaston, none; Summit, 0.80; Ft. Bidwell, 0.72; Salinas, 0.05. *Colorado*, Ft. Lyon, 3.09. *Dakota*, Ft. Stevenson, 0.89; Ft. Sisseton, 5.08; Ft. Sully, 1.93; Ft. Totten, 2.94. *Idaho*, Lewiston, 1.86; Ft. Lapwai, 1.78. *Kansas*, Dodge City, 4.00. *Montana*, Ft. Benton, 1.50; Ft. Shaw, 0.80; Ft. Ellis, 1.16; Ft. Keogh, 1.03; Ft. Logan, 0.93; Ft. Assiniboine, 1.72; Ft. Shaw, 1.51. *Nevada*, Toano, 0.06; Blue Creek, 1.09. *Oregon*, Ft. Stevens, 2.07; Ft. Klamath, 0.20. *Texas*, Ft. Ringgold, 0.73; Ft. Davis, 10.62. *Utah*, Corinne, 0.67. *Washington Ty.*, Dayton, 1.68; Ft. Canby, 1.48; Ft. Townsend, 1.42; Olympia, 0.52.

RELATIVE HUMIDITY.

The percentage of mean relative humidity for the month ranges as follows: New England, from 63 to 83; Middle Atlantic States, 63 to 89; South Atlantic States, 71 to 82; Eastern Gulf States, 69 to 78; Western Gulf States, 61 to 79; Ohio valley and Tennessee, 63 to 78; Lower Lake region, 65 to 77; Upper Lake region, 71 to 78; Upper Mississippi valley, 60 to 70; Missouri valley, 60 to 65; Red River of the North valley, 73 to 76; Texas, 60 to 79; Middle Plateau, 16 to 25; California, 32 to 82; Oregon, 44 to 69. *High stations* report the following averages not corrected for altitude: Pike's Peak, 73.6; Mt. Washington, 80.3; Virginia City, 36.9; Denver, 47.2; Santa Fe, 49.2.

WINDS.

The *prevailing directions of the wind* during August 1880, are shown by arrows, flying with the wind, on chart No. II. From the Mississippi valley westward to the Pacific ocean the predominating winds have been *southerly*, except in the northern half of the Pacific coast region, where they were *northerly*. In New England, the Lower Lake region, the Middle Atlantic States and the Ohio valley, they have been *southwesterly*, except at a few scattered stations. In the South Atlantic States and Tennessee, they were variable, with the *easterly* points predominating. At most stations in the Upper Lake region the prevailing winds were *northerly*. On Mt. Washington the prevailing wind was NW. and the maximum velocity NW. 60, on the 2nd; maximum velocities of 50 miles or more occurred as follows: 10th, 20th, 23rd, 25th, 28th and 29th, NW. 50; 24th, W. 52. On Pike's Peak, the total movement was 8,445, prevailing direction SW., maximum velocity 64 SW. Maximum velocities exceeding 50 miles were reported as follows: Indianola, 64 NE. 13th; Cedar Keys, 64 NE. on the 30th; Yankton, 56 SW. on the 16th and Kittyhawk on the 12th; Punta Rasa, 56 SW. on the 29th, and 56 (72 miles for 5 minutes) S. on the 30th; Brownsville, Tex., 48 miles on the 12th, when anemometer was blown down; exact maximum unknown.

Total Movements of the Air.—The following are the *largest* total movements in the various districts: Mt. Washington (summit of), 18,692 miles; North Platte, 11,167; Cape Lookout, 11,104; Chincoteague, Va., 10,238; San Francisco, 8,855; Indianola, 8,591; Pikes Peak (summit of), 8,445;